BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention and wherein:

Figure 1 shows parametric maps of CBF for pig no. 4;

Figure 2 shows plots of regional CBF values with their standard deviations for individual pigs;

Figure 3 shows the corresponding plot for repeated PET measurement of CBF with ^{15}O butanol;

Figure 4 shows CBV maps obtained with MR and PET, respectively;

Figure 5 plots average absolute MR versus PET values of CBV for corresponding slices under normo- and hypercapnia in 6 pigs;

Figure 6 shows parametric CBF maps determined by PET and NMR, respectively;

Figure 7 shows MR versus PET plots of regional CBF values along with their standard deviations for the six volunteers;

Figure 8 shows the conventional MRI as well as the PET CBF maps from the volunteer 6 and what may reflect a methodological problem of the MR technique;

Figure 9 shows how flow estimates become increasingly underestimated as the arrival delay of the tracer at a brain region increases, in both PET and MR CBF measurements;

Figure 10 shows that the vasculature was modeled a major, feeding artery in series with 20 small vessels in parallel;

Figure 11 shows a set of typical tissue and arterial concentration time curves obtained from volunteer 1;

Figure 12 shows the location and size of three regions chosen for determination of flow heterogeneity in volunteer 4;

Figure 13a shows all pairs of relative transit time t and corresponding h(t) measured for all regions in all 6 volunteers;

Figure 13b shows under the assumption of equal capillary lengths the corresponding plot of relative flow f and w(f) measured for all regions and volunteers;

Figure 14 shows a typical set of tissue concentration time curves as well as the fits provided by the model;

Figure 15 shows gray:white matter flow ratios determined by the model approach plotted versus corresponding ratios in identical regions determined by the SVD approach;

Figure 16a shows the effect of AIF delay on fitted flow rates for the vascular model and the SVD approach, respectively;

Figure 16b shows the fitted feeding artery volume as a function of delay;

Figure 17 shows the means and standard deviations of the fitted flow rates for two sets of simulated data (V_{art}=0.5%, F_p=60 ml/100ml/min, V_p=3%; V_{art}=0.5%, F_p=20 ml/100ml/min, V_p=2%), using the model (Figure 17a) and SVD (Figure 17b) approach, respectively.;

Figure 18 shows fitted flow rates versus corresponding fitted feeding artery volumes from simulated curves with SNR=40;

Figure 19 shows the findings of Hudetz *et al.* and Abounader *et al.* along with the relative plasma flows;

Figures 20a, 20b, and 20c show a typical pattern of patient 6;

Figures 21a and 21b show the initial DWI, initial MTT, initial p/CBF and follow-up FLAIR MRI images of patient 11.

Figure 22 shows that final infarct volumes are compared to the initial abnormalities of DWI+MTT and DWI+p maps, respectively;

Figures 23a and 23b show the respective maps from patient 3;

Figures 24a and 24b show maps from patient 9;

Figure 25 shows one slice from this patient, displaying areas with $p<0.1$;

Figure 26 shows the qualitative analysis of the kinetics of oxygen delivery.

Figure 27 shows typical parametric renal flow images acquired, immediately after and 105 minutes after ureteral occlusion;

Figure 28 shows the temporal evolution of renal plasma flow and volume after ureteral occlusion;

Figure 29 shows transit time characteristics measured as the averaged transport functions in 4 pixels from to regions; and

Figure 30 shows structural T_2-weighted image (left) of a female with a grade II astrocytoma, showing edema in the medial part of the left parietal lobe.